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Presentation Title: SRTM-Assisted Modeling and Measurement of River Runoff and Flooding

Abstract: SRTM-Assisted Modeling and Measurement of River Runoff and Flooding

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High quality topographic data are essential for space-based measurement of the Earth's water cycle, and, in particular, river runoff [1]. However, and as is the case for other environmental data, topographic data are not freely shared by all nations. As a result, the ability to measure or even detect runoff (discharge) changes outside the U.S. has been constrained. Without topography, river flow area changes can be measured by remote sensing, but there is no possibility to calibrate such area changes to discharge. For example, prior to release of the near-global Shuttle Radar Topography Mission (SRTM) topographic data, orbital image data of a major flood along a relatively small river (Pecatonica River, Wisconsin), was used with map-based topography to demonstrate that river water level (stage) could be retrieved by measuring the elevation of water-land boundaries. After obtaining a series of such stage measurements along a river reach, the instantaneous water energy surface was reconstructed, and river discharge estimated by one-dimensional hydraulic modeling using the HEC-II code [2]. Now SRTM information allows the application of such techniques at any location outside the U.S. and wherever supplemental remote sensing at optical wavelengths indicates the topographic data apply to the ground surface rather than to the vegetation canopy. SRTM data are also allowing us

to select measurement reaches for daily monitoring by wide-swath microwave sensors such as QuikSCAT/SeaWinds [3]. SRTM information, alone or coupled to hydraulic modeling, can also be used for extending international flood risk assessments based on in-situ data or on remote sensing. In the case of the tragic flooding in May 2004 at Jimani, Dominican Republic, SRTM information show the location of the flooded settlement within the active floodway, prior to the event, and the lethal reoccupation of this floodway was imaged by the ASTER sensor aboard TERRA [4].

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- [4] Gubbels, T. and G.R. Brakenridge, *Flood disaster hits Hispaniola*. Feature, The Earth Observatory, 2004. <http://earthobservatory.nasa.gov/Study/Haiti2004/>.